

sort of parallel to the most impressive geographical event of last year, which I take to have been the journey of the members of the British Association, by rail, from Capetown to the Zambesi. One of these days the same body will assemble in the Indian Empire, journey over the railroads now existing to Darjiling, and there board a specially chartered train of the "Trans-Tibetan" or the "Asia Central" for some point or other in the Chinese Delta.

Then, perhaps, we shall have, from the entertaining pen of Dr. Hugh Robert Mill, "Central Asia as seen by a meteorologist", illustrated with photographs of the meteorological observatories of Lassa (central office of the Pontifical Tibetan Weather Service) and Singan-fu.<sup>1</sup>

While statesmen are concerned with the political advantages to be derived from the new iron highways into the Asiatic interior, and while the commercial world is counting the material gains sure to accrue from the opening of new countries to trade, the meteorologist may be pardoned for indulging in a little jubilation on his own account, as he beholds the region over which the phenomena of the atmospheric circulation assume grander proportions than anywhere else upon the globe brought more and more fully within the field of his observation. The time can not be far distant, unless wholly improbable circumstances should check the present tide of progress in the eastern world, when the scant and hasty meteorological gleanings of the geographical explorer will give place to data regularly supplied by well equipped observatories and flashed over the earth by wire (or wireless) for the benefit of the weather forecaster.

It is significant of the importance which forecasters, no less than climatologists, attach to the meteorology of Asia, as a preponderating factor in the meteorology of the Northern Hemisphere, that the Indian Meteorological Department has recently arranged to receive daily telegraphic reports from six Russian stations in Siberia, and that the United States Weather Bureau is even now negotiating with the Russian service for reports from the same region. The stations from which these reports will come lie to the north and west of the mean position of the great central Asian winter "high"—the area of greatest pressure observed upon the earth—whether we accept its location as shown on Buchan's charts, the more southerly position in the Russian Climatological Atlas, or the extreme westerly position<sup>2</sup> indicated by certain recent investigations.

While the indications of these outlying stations may suffice to give us a general notion of the pressure fluctuations from day to day, the absolute value of the pressure in this all-important anticyclone must remain a matter of considerable uncertainty until new stations are established, at known elevations, in the very heart of Asia. With the development of railroads in this region, the establishment of the desired stations will be a matter of easy accomplishment. Besides making the region easy of access to European observers, the building of railroads will entail leveling operations supplying the precise altitude data required for the reduction of the pressure to sea level.

Of the many railroad projects now on foot in Asia the one that appears to promise most for meteorology contemplates the building of a line up the Irtysh Valley from some point on the Trans-Siberian Railway to the Chinese town of Chuguchak, within the borders of Sungaria. This is the route by which the Russians are now planning to open Mongolia to their commerce, in lieu of the road which they proposed building

over the old caravan route from Irkutsk to Peking, via Urga, and which was abandoned because of the political results of the Russo-Japanese war. Of but little less importance is the proposed railway across the Kirghiz steppe to Tashkent.

Many circumstances denote the beginning of a new and hopeful era in the meteorological exploration of Asia, but space permits us to mention only two—the abandonment by the Tibetans of the policy which excluded foreigners from their territory (the happy result of the British Mission of 1904), and the recent awakening of China to the advantages of western institutions, especially railroads and telegraphs; of the latter, China now has some 15,000 miles in operation.

The Anglo-Chinese treaty regarding Tibet, signed April 23, 1906, opens certain trade marts in Tibet to the commerce of India, authorizes the Indian government to connect these places with India by telegraph, and grants to the British preference in the matter of railway concessions.

#### DOCTOR KOSTLIVY ON THE CLIMATE OF BEIRUT.

Regierungsrat Stanislav Kostlivy, the veteran vice-director of the Austrian Centralanstalt für Meteorologie, who died October 7, 1905, left behind him, in the press, an elaborate and beautiful discussion of the meteorological observations at the Syrian Protestant College, Beirut, for the twenty-five years, 1876-1900.<sup>3</sup> This monograph is an excellent example of the painstaking methods of the Austrian climatologists, and is commended to the attention of anyone who contemplates writing an extensive discussion of the climate of a single station or small region. Beirut is one of the very few places in the Turkish Empire having a long unbroken meteorological record. The observations at the Syrian Protestant College, which is a purely American institution, have been published *in extenso* in the Jahrbücher of the K. k. Centralanstalt für Meteorologie, Vienna, since 1876.

Among the interesting facts brought out in the present discussion we notice that snow has never fallen in Beirut, though it sometimes falls on the nearby Lebanon and is not of very uncommon occurrence at Jerusalem, 150 miles farther south.

#### AUSTRALIAN HEAT VERSUS WHITE LABOR.

In the course of his Lake Eyre expedition of 1901-2, Dr. J. W. Gregory, of the University of Glasgow, was much impressed with the immunity with which white men pursue the most laborious occupations under the blazing sun of the Australian "back of beyond". His picture of the conditions of white labor in this part of the world is a genuine contribution to "anthropoclimatology":<sup>4</sup>

At Jibuti, in eastern tropical Africa, ten minutes' midday exposure without a hat is said to be inevitably fatal. But in Central Australia even newcomers like ourselves could go about hatless for longer periods without feeling any ill effects. We expected to find everyone hating the heat and devoting their utmost ingenuity to combat it. As the "terai" hats of tropical Africa and India are made of two layers, we expected to find at least a three-storied variety in use around Lake Eyre. Green umbrellas we thought would be man's constant companions, and after Sturt's experiences we should not have been surprised to find advertisements of inks guaranteed to remain liquid through a Central Australian summer, and pencils of plutonic graphite recommended for use in the Lake Eyre basin. (I have been seriously assured that Sturt could not keep a diary through the hot weather, as the heat softened the lead in his pencils.) But, on the contrary, the residents adopt no special precautions against heat. Our efforts to buy a sun umbrella were in vain; one storekeeper assured me that they were rarely used north of Adelaide. Houses are built of corrugated iron and not one in a dozen condescends to a veranda. \* \* \*

But in spite of the heat the people looked extremely well. The children were harder and less anemic than those at Adelaide. Doctor Kennedy assured me that there is no illness in the district, and that his post would be a sinecure were it not for ophthalmia and other ailments of the eyes. To my surprise we found men working in the open air at severe manual labor without adopting any precautions or special clothes. Simple slouch felt, or thin straw hats are generally worn, and our cook

<sup>1</sup> Cf. Doctor Mill's delightful chat, "South Africa as seen by a meteorologist", in Quarterly Journal of the Royal Meteorological Society, July, 1906.

<sup>2</sup> With a center near Turfan, longitude 89° east, latitude 43° north, in Chinese Turkestan. See Comptes Rendus Acad. des Sciences, Paris, t. CXXVIII, No. 3 (January 16, 1899), p. 154.

<sup>3</sup> Kostlivy, Stanislav. Untersuchungen über die klimatischen Verhältnisse von Beirut, Syrien. Prag, 1905.

<sup>4</sup> Gregory, J. W. The dead heart of Australia; a journey around Lake Eyre in the summer of 1901-2... London, 1906.

defied the sun in a black hard felt "bowler"; yet notwithstanding the neglect of ordinary tropical precautions everyone looked in the best of health. The men are bronzed and tanned; but one is glad to miss the sallow complexions and wan faces that Europeans show in tropical African coast towns.

The tolerance of heat shown in this part of Australia certainly supports Sambon's theory in regard to acclimatization. Sambon holds that there is nothing to prevent Europeans living and working as well as any black race in the hottest of tropical localities. He maintains that the supposed unsuitability of the Tropics for European settlement is due to disease and not to climate, and that as the special tropical diseases are due to germs, they may be cured or prevented when the life histories of the germs are known.

Of course the climate of subtropical Australia, with its exceedingly low humidity (in the interior) and its wide annual range of temperature, is quite unlike that of those regions, such as West Africa and the Philippines, which have been especially under discussion in the recent voluminous literature for and against white colonization of the Tropics. It should be compared, rather, with the southwestern United States or northern Argentina, in which Europeans seem to thrive no less than in Australia. However, the problem of acclimatization is so important and is, moreover, so far from a satisfactory solution that all observations bearing upon it must command attention. In the present stage of investigation the difficulty seems to be to extricate the immediate effects of meteorological conditions upon man from those indirect influences which are exerted through the medium of disease germs, the latter finding some climates more favorable to their development than others. Doctor Sambon is one of those who hold that climate *per se* plays but an insignificant part in determining the health of our race.<sup>5</sup>

DOCTOR HELLMANN'S "PRECIPITATION IN THE NORTH GERMAN RIVER BASINS".<sup>6</sup>

The scope of this work is not fully indicated by its title. Among North German rivers Doctor Hellmann includes all the streams of Germany that discharge their waters into the Baltic and North seas. Consequently only one important river system of Germany, that of the Danube, is excluded from consideration in this treatise.

In three massive volumes the author has gathered together all material regarding the rainfall of the German river basins, with the exception above noted, available down to the close of 1890, the year in which this great work was begun. In the case of rivers that take their rise outside of Germany, the territory considered includes all the upper basin of the river, from its source; consequently a great wealth of data for Russia, Austria-Hungary, Switzerland, France, and Belgium is here presented, so that this work constitutes by far the most extensive compilation of rainfall statistics ever made. The total number of stations represented in the tables is 3983, of which 2220 lie within the German Empire.<sup>7</sup>

The data tabulated comprise, for all or a part of the stations: Monthly and annual rainfall for each year of observation; greatest daily rainfall in each month; number of days with a measurable amount of rain; number of days with more than 0.2 mm.; number of days with snow; dates of first and last snowfall; number of days with sleet and hail.

<sup>5</sup>See his paper, "Acclimatization of Europeans in tropical lands", in the *Geographical Journal*, December, 1898, p. 589, and the interesting discussion thereon. See also C. Abbe in "Liberia" 1892, Bulletin No. 1, pp. 34-40, American Colonization Society, November, 1892, "Climate and Health in Liberia".

<sup>6</sup>Hellmann, G. Die Niederschläge in den norddeutschen Stromgebieten. Berlin. 1906. 3 vols.

<sup>7</sup>The most extensive works of this character heretofore published are Wild's "Regenverhältnisse des Russischen Reiches" and Elliot's "Rainfall of India". The former comprises results from 451 stations; the latter, 456. Schott's rainfall tables for the United States include some 1200 stations, but give the records in much less detail than do the works above named. Supan's "Verteilung des Niederschlags", with 1223 stations, is a collection of normals only.

The average length of a record is seven and one-half years. The following stations, within the region under discussion, have records of fifty years or more (to and including 1890):

*In Germany.*—Königsberg, 51 y.; Tilsit, 71 y. 3 m.; Danzig, 57 y. 7 m.; Breslau, 54 y. 9 m.; Gütersloh, 53 y. 11 m.; Münster, 51 y. 11 m.; Bayreuth, 59 y. 10 m.; Dresden 58 y.; Freudenstadt, 56 y. 1 m.; Isny, 57 y. 9 m.; Stuttgart, 72 y. 1 m.; Arnstadt, 53 y. 5 m.; Bremen, 60 y. 6 m.; Lübeck, 50 y. 5 m.; Frankfurt a. M., 54 y. 3 m.

*In Russia.*—Warsaw, 84 y. 7 m.

*In Austria.*—Bodenbach, 55 y. 4 m.; Deutschbrod, 55 y. 8 m.; Lemberg, 56 y. 8 m.; Prague, 51 y. 5 m.

*In France.*—Nancy, 58 y.

Owing to the diversity in the lengths of the records and in the periods to which they refer, and to other circumstances that render the older records mutually incomparable, the data tabulated in this work have not been charted. Instead, a rainfall chart (for Germany only) has been made up from observations of some 3000 stations during the decade 1893-1902; during which time fairly uniform methods of observation were in vogue, and the short records were quite easily reduced to the full period. This chart shows that—

1. The rainfall of Germany decreases from west to east, both along the coast and in the interior.

2. The coastal plains have less rain than the interior.

3. The rainfall is remarkably dependent upon altitude, so that the rain chart indicates the relief of the country quite closely. Deeply shaded areas, denoting heavy rainfall, indicate the location of the important mountain ranges—Harz, Schwarzwald, Bavarian Alps, etc.—but many minor elevations are rendered conspicuous by the fact that relative altitude has more influence than absolute altitude in increasing the rainfall.

4. The effect of the prevailing westerly winds is clearly shown in the heavier rainfall on the west slopes of the mountains.

The first volume of Doctor Hellmann's work forms the text discussion of the results tabulated in volumes 2 and 3, and in it the student of rainfall will find much that is suggestive and of general application. The fluctuations in the rainfall of Germany and neighboring countries during the eighteenth and nineteenth centuries are fully treated.

From the many interesting contributions to climatology contained in this work we extract the following Table 1, showing the most remarkable cases of excessive rainfall, of at least one hour's duration, recorded within the German Empire:

TABLE 1.—*Excessive rainfall in Germany.*

Place.	Date.	Duration.		Amount.
		<i>h.</i>	<i>m.</i>	<i>Inches.</i>
Waltershausen, Saxony	Aug. 14, 1884	1	00	2.95
Neustadt-on-the-Hardt	Sept. 7, 1886	1	00	3.86
Schwerin, Mecklenburg	May 11, 1890	1	35	4.37
Bohlsberg, Brandenburg	June 21, 1895	2	00	5.08
Wildgarten, West Prussia	Aug. 1, 1896	1	40	5.28
Kemnitz, Saxony	July 17, 1887	2	00	5.50
Görsdorf, Brandenburg	June 12, 1889	2	15	5.20
Berlin	Apr. 14, 1902	3	30	5.63

<sup>a</sup>A village near Neustadt. Not Chemnitz.

<sup>b</sup>Approximately.

## PROGRESS OF METEOROLOGY IN AUSTRALIA.

By reading the dispatches from Melbourne, published in the *Daily Telegraph*, Sydney, N. S. W., June 16, 21, 22, 23, and 28, we see the progress being made toward the passage of the bill establishing a federal meteorological system for the whole of Australia. This bill was read for the first time in the Australian Senate on June 16; it makes provision for the appointment of a federal meteorologist, charged with the following duties: